

EASTERN SNOW CONFERENCE - RESEARCH COMMITTEE

FEBRUARY, 1962

I - SNOW RESEARCH PROJECTS, 1962

Project: SNOW SURVEY AT SCHEFFERVILLE, P. QUE.

Investigator: McGill Sub-Arctic Research Lab., Box 790, Schefferville,  
P. Que., Canada.

Scope: This project is concerned mainly with the collection of data on snow depth, density, w.e., stratigraphic record, hardness and surface features in three main study projects: (1) investigations of permafrost in nearby areas, (2) ice thickness survey of local lakes, (3) comparative study of an exposed site and a sheltered site in the vicinity of the McGill Lab. In the first two studies the main consideration is snow's effect in the heat transfer processes at the ice or ground surface.

Reports: McGill Sub-Arctic Research Papers. Contact W. G. Mattox, Director, at the above address.

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Project: CORRELATION OF SNOWPACK WATER EQUIVALENT AND CLIMATIC CONDITIONS.

Investigator: G. A. McKay, Regina Airport, Hydrology Div., Prairie Farm Rehabilitation Admin., 614 Motherwell Bldg., Regina, Saskatchewan, Canada.

Scope: To be able to compute the water equivalent of the shallow-prairie snowpack from available climatological data. Water equivalent data are required for runoff computations. Two snow courses are operated and observations correlated with climatological data from adjacent first-order meteorological station. Snowfall-snow depth and temperature data for other first-order-prairie weather stations are being analyzed to check validity of findings for other prairie areas.

Reports: "Plains snowpack water equivalent from climatological records" by G. A. McKay and S. R. Blackwell. Western Snow Conf. Proc. 1961, pp. 27-43.

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Project: RELATIONSHIP BETWEEN DENSITY OF NEW FALLEN SNOW AND METEOROLOGICAL VARIABLES (NATIONAL SCIENCE FOUNDATION C-181).

Investigator: Bernard A. Power, Weather Engineering Corporation of Canada, Ltd. 2030 Crescent Street, Montreal 25, Quebec.

Scope: (1) To determine if a relationship exists between density of newly fallen snow and snow crystal type, and (2) to relate the density of newly fallen snow to the meteorological conditions in the upper atmosphere where the snow is formed, (through the already established relationship (Nakaya) between crystal type and temperature/humidity conditions).

Reports: First season's work (1960-61) submitted for publication.

Project: JACOBSEN-McGILL ARCTIC RESEARCH EXPEDITION TO AXEL HEIBERG ISLAND,  
N.W.T., CANADA.

Investigator: Dr. Fritz Müller, McGill University, Montreal 2, P. Que. Canada.

Scope: (informal statement): To study the physiographic evolution of the west-central section of strongly glaciated and glacierized Axel Heiberg Island through an integrated program in the earth sciences, including glaciology, geomorphology, geology, meteorology, geophysics and surveying.

Reports: "Preliminary Report 1959-1960". Jacobsen-McGill Arctic Res. Expedition to Axel Heiberg Island. Montreal. McGill Univ., 219 pp. June 1961, \$2.50. (Obtainable from the Expedition).

Descriptive Notes: 1959 season: Polar Record, Vol. 10, No. 64, pp. 45-46 ( )  
1960 season: Polar Record, Vol. 10, No. 68, pp. 518-21 ( )

Unpublished Meteorological Report: "A meteorological and glacial-meteorological reconnaissance of 'McGill Ice Cap', Axel Heiberg Island, N.W.T., Canada by James M. Havens (M.Sc. thesis, London Univ.).

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Project: SUMMARY OF CURRENT RESEARCH IN CANADA ON SNOW AND ICE.

Investigator: Snow and ice subcommittee of the associate committee on soil and snow mechanics of the National Research Council of Canada. Ottawa, Ontario, Canada.

Scope: Summary of investigations conducted by two departments and two research organizations of the Federal government and by three universities and one company in Canada.

Reports: The 9-page mimeo report, A.C.S.S.M. Note No. 6, August 1961, is available from the Secretary, Snow and Ice Subcommittee, A.C.S.S.M., National Research Council, Ottawa.

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Project: FIELD STUDY ON THE BEARING CAPACITY OF ICE.

Investigator: Mr. L. W. Gold, Div. of Bldg. Res., National Research Council, Ottawa, Canada.

Scope: A record is being kept of the ice cover failures which occurred during the normal operations of pulp and paper companies. This study was enlarged in the winter of 1961-62 to include observations on the loads placed successfully onto ice covers. Over 60,000 trips, placing a total of over 850,000 tons of wood onto the ice, were recorded in this study. Twelve ice failures occurred in the placing of this wood.

Reports: "Field study on the load bearing capacity of ice covers" by L. W. Gold. Pulp and Paper Magazine of Canada, Woodlands Section, Vol. 61, No. 5, May 1961. Reprinted as DBR Technical Paper No. 98, NRC 5712. Discussion of "Bearing capacity of floating ice sheets" by G. G. Meyerhof (discussed by L.W. Gold). Jour. of Amer. Soc. Civil Engineers, Engineering Mechanics Div., Vol. 87, EM 2, pp. 83-88, April 1961.

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Project: ENERGY EXCHANGE AT SNOW, ICE AND WATER SURFACES.

Investigators: G. P. Williams, Div. of Bldg. Res., National Research Council, Ottawa, Canada.

Scope: Observations are being continued on the energy exchange at snow surfaces during the winter. A net radiometer designed by the CSIRO in Australia was in use in 1961 and a Suomi type instrument is to be installed soon. Observations are being made also on water temperatures in a small lake in Ottawa.

Reports: "Energy balance during the snow melt period at an Ottawa site" by L. W. Gold and G. P. Williams. International Assoc. of Scientific Hydrology, Publication No. 54, pp. 288-294. Reprinted as DBR Research Paper No. 131, NRC 6283. "Radiation balance at Ottawa during the snow-melt period" by D. W. Boyd, L. W. Gold and G. P. Williams. Presented to the 18th Annual Meeting of the Eastern Snow Conference, February, 1961.

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Project: INVESTIGATIONS ON SNOW ROADS.

Investigator: Dr. B. H:son Ager, Div. of Bldg. Res., National Research Council, Ottawa, Canada.

Scope: This study of the techniques used in Canada by the pulp and paper industry to prepare snow roads and ice landings included investigations made in the field during the winter of 1960-61.

Reports: "Snow roads and ice landings" by B. H:son Ager. Pulp and Paper Magazine of Canada, Woodlands Section, July 1961. Reprinted as DBR Technical Paper No. 127, NRC 6411.

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Project: MELTING OF ICE AND SNOW BY THE APPLICATION OF DUST.

Investigator: G. P. Williams, Div. of Bldg. Res., National Research Council, Ottawa, Canada.

Scope: A literature review is being made and field experiments are being started this winter to determine the effectiveness of various materials for accelerating the melting of ice and snow and to evaluate various techniques for spreading such materials.

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Project: INFLUENCE OF SNOW COVER ON GROUND THERMAL REGIME.

Investigator: L. W. Gold, Div. of Bldg. Res., National Research Council, Ottawa, Canada.

Scope: Records are being accumulated on the temperature of the ground at various depths and on the depth and density of the overlying snow cover. These observations are to be analysed to see what influence the snow cover has on the ground thermal regime.

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Project: SNOW LOADS ON ROOFS.

Investigator: W. R. Schriever, Div. of Bldg. Res., National Research Council, Ottawa, Canada.

Scope: Observations of the depth and density of the accumulated snow on roofs in various parts of Canada are being continued. The main factors being investigated are the influence of the wind and the shape of the roof on the snow accumulation patterns.

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Project: NOZZLES FOR ARTIFICIAL SNOW.

Investigator: J. Samolewicz, Div. of Mechanical Engineering, National Research Council, Ottawa, Canada.

Scope: Investigations are being conducted into the characteristics of spray nozzles used for making artificial snow.

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Project: AIR BUBBLERS TO MELT ICE.

Investigator: Dr. S. Ince, Div. of Mechanical Engineering, National Research Council, Ottawa, Canada.

Scope: The possibilities and limitations in the use of air bubbles to melt ice or to prevent its formation by moving warmer or more saline water to the surface is being investigated both by theoretical and experimental studies.

Reports: "Thermal regime of lakes and rivers with reference to air bubbling systems" by G. P. Williams. "Recent experimental observations on the use of air bubbling systems" by S. Ince. Both in Proceedings of the Symposium on Air Bubbling, Ottawa, 11 May, 1961. Technical Memorandum No. 70, Assoc. Com on Soil and Snow Mechanics, National Research Council, Canada.

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Project: ST. LAWRENCE RIVER ICE AND TEMPERATURE SURVEYS.

Investigator: E. Turner, Div. of Mechanical Engineering, National Research Council, Ottawa, Canada.

Scope: During the winter of 1960-61, observations were made on the water temperatures in the St. Lawrence River between Kingston and Beauharnois. Observations were also made on the ice conditions in the St. Lawrence River below Montreal. These observations are part of an overall programme being conducted by the Hydraulics Section on the hydraulics of the St. Lawrence River.

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Project: OPERATION HAZEN GLACIOLOGICAL STUDIES.

Investigator: Dr. G. Hattersley-Smith, Geophysics Section, Defence Research Board, Ottawa, Ontario, Canada.

Reports: "A short report on snow and ice conditions on Lake Hazen, winter 1957-58" by C. R. Harrington, Defence Research Board, Ottawa: D Phys R (G) Hazen 7, 64 pp., 1960. "Some glaciological studies in the Lake Hazen region of northern Ellesmere Island" by G. Hattersley-Smith, In Raasch, G. O. (Ed.) Geology of the Arctic (Vol. 2), Toronto: 791-808, 1961. "Snowfall measurements in northern Canada" by C. I. Jackson, Q. J. Roy. Met. Soc., Vol. 86, No. 368, 273-275, 1960. Obtainable from Geophysics Section, Defence Research Board.

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Project: MAXIMUM SNOWMELT CONTRIBUTIONS TO DESIGN FLOODS.

Investigator: J. P. Bruce, Meteorological Branch, Canada Dept. of Transport, 315 Bloor Street West, Toronto 5, Ontario, Canada.

Scope: To estimate maximum snow accumulations and melting rates in various watersheds in Canada including the Manicouagan, St. John, Columbia and Frase

Reports: Report on the Manicouagan to be given at Eastern Snow Conference 1961. Others are for completion in 1962 or 1963.

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Project: SNOW SURVEY STATIONS.

Investigator: Canada Dept. of Transport, Meteorological Branch, 315 Bloor Street West, Toronto 5, Ontario, Canada.

Scope: Meteorological Branch is inaugurating snow surveys this winter at approximately a dozen stations across the country. Within the next few years this network may be expanded to include about 100 stations. The network of snow survey stations consists of two types of stations. At type A stations, a fixed 10-point snow course will be established representative of the surrounding area. Observations will be taken on the 1st and 15th of each month at a convenient time during the morning. At the other type of stations observations will be taken on a fixed 5-point course in or near the instrument enclosure, on the 1st, 8th, 15th and 23rd of each month at a convenient time in the morning.

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Project: COLDWATER.

Investigator: J. G. Cassan, Ontario Hydro, 620 University Avenue, Toronto, Ontario, Canada.

Scope: Measure accurately the rate of precipitation in the form of rain and snow and to co-relate this rate with the corona losses in kilowatts of an extra-high voltage transmission line.

Reports: "Instrumentation for power loss and meteorological measurements at Ontario Hydro Coldwater project" by J. M. Vanderleek. "Sensitive recording-type precipitation gauge" by O. W. Iwanusiw. For copies apply to R. H. Hawkins, Editor, Ontario Hydro Research Division, 200 Kipling Avenue South, Toronto 18, Ontario, Canada. (Not Published)--Report on coldwater snow gauge accuracy in wind, by O. W. Iwanusiw. Bendix-Friez Universal rain and snow gauge model 775 CS: The sensitivity of this gauge has been increased by use of a large collector and modification to the weighing apparatus. Information on these may be obtained from H. C. Ross, Director of Research, Ontario Hydro, Research Division, 200 Kipling Avenue South, Toronto 18, Ontario, Canada.

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Project: SHAPE FACTORS OF AGRICULTURAL STRUCTURES RELATED TO WIND.

Investigator: F. H. Theakston, Ontario Agricultural College, Dept. of Engineering Science, Guelph, Ontario, Canada.

Scope: Graduate Thesis (K.Lin). To determine lines of separation of stream lines over various shapes of roof structures using a vertical wind tunnel and smoke. Objective is to determine suitable roof shapes for better deployment of snow and wind.

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Project: STUDY OF SNOW FENCES AND WIND BARRIERS RELATED TO FARM STRUCTURES.

Investigator: F. H. Theakston, Ontario Agricultural College, Dept. of Engineering Science, Guelph, Ontario, Canada.

Scope: Graduate Thesis (H. Bellman). To study the pattern of snow around snow fences and windbreaks for proper location and design of the fences. Pressure studies will be carried out in a wind tunnel and observations made in a water flume (using model buildings and light sand to simulate snow).

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Project: SNOW ACCUMULATION IN AND AROUND FARM STRUCTURES.

Investigator: F. H. Theakston, Ontario Agricultural College, Dept. of Engineering Science, Guelph, Ontario, Canada.

Scope: The study of snow patterns and accumulation around and in agricultural structures (particularly open front buildings) to determine methods of arrangement of the buildings to prevent undue accumulation. This is associated with wind patterns in the buildings causing drafts. Location of snow in the structure will indicate high load points and will facilitate better design. Model buildings constructed of plexi-glass are used in a wind tunnel and water flume (using light sand as a medium representing snow).

Reports: "Snow accumulation in and around farm buildings." "Snow patterns on farmsteads related to arrangement of buildings."

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Project: EVAPORATION FROM A SNOW SURFACE.

Investigator: D. F. Witherspoon, K. M. King, Ontario Agricultural College, Dept. of Engineering Science, Guelph, Ontario, Canada.

Scope: To study the parameters of microclimate in relation to the energy balance over a snow surface.

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Project: INFLUENCE OF SNOW AND FROZEN SOILS ON RUNOFF.

Investigator: Martin L. Johnson, Agricultural Research Service, Sleepers River Research Watershed, Danville, Vt.

Scope: (1) To evaluate the factors affecting the accumulation, metamorphosis, and melting of the snow pack, (2) develop methods of predicting runoff contributions from snowmelt in ungaged watersheds, using commonly available data, (3) to investigate frost occurrence, type, penetration, and the probability of a major storm occurring while soil permeability is reduced by frost. Instrumentation consists of: 24 recording rain-snow gages, 16 ten-sample snow courses measured weekly, 6 soil moisture stations, 9 continuous recording stream gages, and numerous anemometers; soil, air, and snow temperature thermometers, hygrothermographs, etc. Research was initiated in the fall of 1960.

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Project: INFLUENCE OF SOIL AND LAND USE ON RUNOFF.

Investigator: George Comer, Agricultural Research Service, Sleepers River Research Watershed, Danville, Vt.

Scope: To evaluate the effects of the physical characteristics of watersheds (under 200 acres) on their hydrologic performance. The cover conditions and the type of precipitation will also be included in the study. Ten-sample snow courses will be taken in each watershed to determine snow depth and water equivalent. This data will be used to determine the effect of snow cover on the discharge rates and water yield from watersheds. Flow duration curves will be determined for each month to aid in quantitatively evaluating the effects of the snow cover on runoff. Project started in November, 1961.

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Project: PRECIPITATION CHARACTERISTICS.

Investigator: Edwin Engman, Agricultural Research Service, Sleepers River Research Watershed, Danville, Vt.

Scope: Twenty-four recording rain-snow gages and sixteen snow courses are being maintained to provide basic precipitation data. Specifically, as soon as sufficient length of record has been collected typical intensity-duration-frequency, depth-duration and depth-duration-frequency curves will be plotted, summarized and published. Studies are currently being made to determine how precipitation amounts and intensities are influenced by elevation and storm source and direction. Also, the instrument network is being studied in conjunction with analysis of various methods for calculating average watershed precipitation and snow cover. Research was initiated in the summer of 1961.

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Project: SNOW AND FROST MEASUREMENTS ON GAGED WATERSHEDS.

Investigator: Robert S. Pierce, Northeastern Forest Expt. Sta., U.S. Forest Service, Laconia, N.H.

Scope: To relate forest-watershed snow and frost conditions to streamflow. Weekly measurements are taken on eight snow courses on 4 experimental watersheds.

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Project: SNOW AND FROST MEASUREMENTS FOR CALIBRATION AND TREATMENT OF GAGED WATERSHEDS.

Investigator: Robert S. Pierce, Northeastern Forest Expt. Sta., U.S. Forest Service, Laconia, N.H.

Scope: To compare snow and frost conditions on forested watersheds and their relationship to streamflow before and after watershed treatment.

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Project: SNOW AND FROST RELATIONSHIPS TO THE FOREST ENVIRONMENT.

Investigator: Robert S. Pierce, Northeastern Forest Expt. Sta., U.S. Forest Service, Laconia, N.H.

Scope: To investigate snow accumulation and melt and soil frost occurrence and depth as they relate to micro-relief, stand density, temperature and radiation, and forest floor conditions.

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Project: RESEARCH ON SNOW, ICE, FROZEN GROUND AND PHOTOGRAPHIC INTERPRETATION.

Investigator: W. K. Boyd, Technical Director, U.S. Army Cold Regions Research & Engineering Laboratory, Hanover, N.H.

Scope: The U.S. Army Cold Regions Research and Engineering Laboratory located in Hanover, N.H., incorporates the former Snow, Ice and Permafrost Research Establishment previously located in Wilmette, Illinois, and the Arctic Construction and Frost Effects Laboratory formerly in the New England Division, Corps of Engineers Office. Research in CRREL is conducted by four technical divisions: Research, Experimental Engineering, Photographic Interpretation and Technical Services, with each division subdivided into relevant branches. The program covers a wide field of about 60 in-house projects and 25 outside contracts or grants with universities. These projects include basic and

applied research, development and design criteria evaluation, research on methods of photo interpretation of the earth surface and development of instruments and techniques applicable to cold regions problems. With a staff of almost 200 people supported by another 100 engaged in grant and contract projects, the scope of CRREL's research program is much too large to permit even a brief outline of the separate projects.

Reports: By application to Chief, Technical Services Div., USA CRREL, Hanover, N.H.

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Project: PREDICTION OF ICE COVER FORMATION IN THE INT'L. RAPIDS SECTION OF THE ST. LAWRENCE RIVER.

Investigator: Robert D. Conner, Power Authority of the State of New York, Box 110, Massena, N.Y.

Scope: In most areas of the St. Lawrence River between Ogdensburg, N.Y. and the Moses Power Dam, channel excavation was accomplished to provide velocities of 2.25 fps or less with expected winter flows; previous studies having established that with higher velocities, a cover would not form. It is well known that frazil ice will not form under a cover. However, it was uneconomic to enlarge the natural channel in two reaches of the project to provide these reduced velocities. Ice jams can form in these two higher velocity areas to severely restrict the inflow--during January 1959, the first winter of operation, the inflow was reduced by 40,000 cfs by a jam near Cardinal, Ontario. This jam formed in a matter of hours and could have possibly been avoided if powerhouse flows had been reduced somewhat in advance of the time the ice cover reached this area so as to lessen the velocities. With this background, I am attempting to correlate air temperatures with the progress of ice cover formation to provide advance warning as to when curtailment of Moses flows might be advantageous to permit extension of the cover over the higher velocity areas of Lake St. Lawrence.

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Project: THE COMPLEX SNOWFALL DISTRIBUTION IN NEW YORK STATE.

Investigator: Robert A. Muller, Geography Department, Syracuse University, Syracuse, N.Y.

Scope: To study the complex distribution of snowfall in New York state. The study indicates "that no simple generalization concerning latitude and elevation relationships of snowfall is adequate. An entirely objective analysis of the snow resource in the maximum accumulation areas awaits the reliable measurement of snowfall at higher elevations and a rigorous model of the cell-like lake snowsqualls."

Reports: Presented at the New York meeting of the American Association for the Advancement of Science, 1960. Obtainable from the author.

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Project: SNOW DEPOSITION AND MELT UNDER DIFFERENT VEGETATIVE COVERS IN CENTRAL NEW YORK.

Investigator: Arthur R. Eschner, State University of New York, College of Forestry, Syracuse 10, N. Y.

Scope: To determine the relative rates of snow deposition and melt on open land and under forest stands of different species and densities on the Tully Forest



in central New York. A series of snow courses to be measured weekly have been established under pioneer hardwoods, northern hardwoods, red pine and Norway spruce plantations of two densities, and open land.

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Project: RADAR DETECTION OF SNOW.

Investigator: B. L. Wiggin, Weather Bureau Airport Station, Greater Buffalo International Airport, Buffalo, N.Y.

Scope: To determine capabilities of U.S. Weather Bureau WSR-57 radar in (1) detection and identification of snow and (2) rate and spatial distribution of snowfall. The radar to be used was commissioned 29 October, 1961. This first snow season (1961-62) will be one of familiarization with the new equipment and for stabilizing it through continuous use.

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Project: SECOND YELLOWSTONE FIELD RESEARCH SEMINAR 1962.

Investigator: Dr. Vincent J. Schaefer, Atmospheric Sciences Research Center, State University of New York, 8 Thurlow Terrace, Albany, N.Y.

Scope: Studies of snowcrystal growth rates electrification phenomena, supersaturation of water vapor, silver iodide and dry ice seeding effects, infrared transmission in snow on ground and in air.

Reports: Final report First Yellowstone Field Research Seminar. Obtainable from Dr. David Barry, Director, at above address.

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Project: SNOWFALL FREQUENCIES AND SNOWCOVER DATA.

Investigator: Robert E. Lautzenheiser, S/C, Weather Bureau State Climatologist, 1900 P. O. Bldg., Boston 9, Mass.

Scope: Tabulate frequencies of daily snowfalls of 1 inch or more, 2 inches or more, etc., by months and seasons for period of record up to but not exceeding 30 years. For same period, tabulate beginning and ending of snowcover of measurable amount where snowcover is continuous for an extended period, usually for a period exceeding one month. For those seasons with such a prolonged cover, calculate the average date of beginning and ending of the period. Calculate the average seasonal maximum depth of snowcover and the average date of occurrence of this maximum. These tabulations to be made for various selected stations in Massachusetts and Northern New England. Eventual goal to produce a bulletin or paper for the area after sufficient stations have been completed.

Reports: Initial publication is for individual stations in the series, Substation Climatological Summaries, Climatography of the U. S. No. 20. These are available at the above address for the following stations: Maine: Augusta; Mass.: Fall River, Haverhill, Tully Dam (Orange-Athol-Royalston); New Hampshire: Berlin, Durham, Franklin, Hanover, Keene; Vermont: St. Johnsbury.

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Project: ALPINE CLIMA--GEOMORPHOLOGY OF THE CASCADES AND OTHER WESTERN MOUNTAIN

Investigator: W. Thompson, Earth Sciences Division, QM R&E Command, Natick, MA

Scope: Description of climate-based environmental regions in the mountains of the world.

Reports: Preliminary discussion of the climate-geomorphology of western ranges and other mountains was included in "The Shape of New England Mountains", Appalachia, December 1960, June 1961, and December 1961, published by the Appalachian Mountain Club. A limited number of separates are available at the above address.

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Project: \* OBJECTIVE WEATHER PREDICTION.

Investigator: Travelers Research Center, Inc., 650 Main Street, Hartford 3, Conn.

Scope: \* This is not exact title of any specific research project, but is a general description of several projects currently being carried out by the Travelers Research Center, Inc. under sponsorship of the U. S. Air Force, U. S. Weather Bureau, and the Federal Aviation Agency. Studies are not directly concerned with snow, but with the development of automated, objective techniques employing high-speed electronic computers for predicting storm movement and resultant weather. Snow, of course, is included as one weather parameter of interest.

Reports: List of published reports and further information can be obtained from Mr. R. L. Carnahan, Director of Plans and Programs.

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Project: FOREST HEAT BUDGET STUDIES.

Investigator: William E. Reifsnyder, Yale School of Forestry, Marsh Hall, 360 Prospect Street, New Haven 11, Conn.

Scope: To determine the complete energy and moisture budget for selected forest stands and to relate the components of the budget to stand parameters. A plantation near New Haven is currently being investigated and measurements will be taken in this stand under various meteorological conditions and at various times of the year, including situations with snow on the ground. It is expected that the measurements will be replicated by observations in other stands in other sections of the country. Such analytical systems for predicting heat budgets as are developed will be tested in these other stands.

Reports: "The climate of shade" by Paul E. Waggoner, A. Boyd Pack and William E. Reifsnyder, Connecticut Agricultural Experiment Station Bulletin 626, 39 pp., 1959. This bulletin and other material as issued can be obtained from the principal investigator.

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Project: INFLUENCE OF SNOW FIELDS ON ATMOSPHERIC BEHAVIOR.

Investigator: Jerome Namias, U.S. Weather Bureau, Washington 25, D. C.

Scope: To investigate interactions (feed-back) between atmosphere and snow for long period forecasting purposes.

Reports: Weatherwise: December 1960. UNESCO Symposium on Climatic Fluctuations, Rome, October 1960--to be published.

Project: BIBLIOGRAPHY ON SNOW, ICE AND PERMAFROST.

Investigator: John Sherrod, Library of Congress, Science and Technology Division, Washington 25, D.C.

Scope: Under an agreement with the U. S. Army Cold Regions Research and Engineering Laboratory, library research has been conducted since 1950 to locate and abstract all of the world's technical literature dealing with the basic properties and applications of snow, ice and frozen ground. To date, 20,000 abstracts have been prepared covering literature originally published since the beginning of the 18th century in any of over 30 different languages.

Reports: The bibliography is published on an annual volume basis. Volume 14 dated January 1960 is available for \$3.00 a copy as PB 171190 from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Availability of Volume 15, dated January 1961, from OTS is expected to be announced shortly. Official requests for copies of the bibliography may be addressed to the U. S. Army Cold Regions Research and Engineering Laboratory, Hanover, N. H.

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Project: SNOW MELT PROCEDURE.

Investigator: Roy Lundquist, Weather Bureau, River Forecast Center, Cincinnati, Ohio.

Scope: To develop an operational procedure for computing daily snow melt based on heat budget concept. The factors of solar radiation, air temperature, dewpoint, wind, and albedo are used in the analysis.

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Project: PREDICTION OF FORMATION AND BREAKUP OF ICE ON RIVERS.

Investigator: Roy Lundquist and Vernon T. Houghton, Weather Bureau, River Forecast Center, Cincinnati, Ohio, and Weather Bureau Office, Pittsburgh, Pa.

Scope: To develop operational methods for predicting formation of ice cover and also date of breakup.

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Project: TELEMETERING HYDROLOGIC DATA FROM MOUNTAIN LOCATIONS.

Investigator: C. C. Warnick, University of Idaho, Moscow, Idaho.

Scope: To study basic ways of transmitting snow data from remote mountain locations. Parameters being considered are snow water equivalent, snow quality and temperature at the snow-soil interface.

Reports: Western Snow Conference Proceedings for April 1960. Progress reports available on loan.

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Project: STUDY OF METHODS FOR AUTOMATIC MEASUREMENT OF SNOW WATER CONTENT.

Investigator: C. C. Warnick, University of Idaho, Moscow, Idaho.

Scope: To study basic methods of measuring snow water content for use in telemetering data. This is a contract study for the Agricultural Research Service.

Reports: Progress reports on loan and M.S. theses on loan from library.

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Project: STUDY OF RADIOISOTOPE SNOW GAGE COMPONENTS AND TECHNIQUES.

Investigator: Don L. Duncan, University of Idaho, Moscow, Idaho.

Scope: To study basic problems of using radioisotopes for measuring the water equivalent of a snow pack. This is a contract study for the Corps of Engineer

Reports: Contract report may be available through Corps of Engineers.

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Project: RADAR PRECIPITATION STUDY.

Investigator: Lloyd H. Magar, Weather Bureau, Weather Bureau Office, Sacramento, Calif.

Scope: To develop an operational procedure for estimating seasonal accumulation of snow pack water equivalent data for weather radar echo intensity and duration observations.

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Project: CALIFORNIA COOPERATIVE SNOW MANAGEMENT RESEARCH.

Investigator: Henry W. Anderson, U.S. Forest Service, Pacific Southwest Forest and Range Expt. Sta., P. O. Box 245, Berkeley 1, Calif.

Scope: Comprehensive study of the hydrology of the snow zone of California, with emphasis on study of the hydrologic processes which are affected by or may be affected by management. Nine scientists are working singly and jointly on some 20 individual studies, ranging from regional studies of floods, water yield and sedimentation, to heat balance over snow fields, to snow density measurements with radioactive probes.

Reports: (Lists 41 publications from this project).

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Project: (1) ACCUMULATION OF SNOW IN FOREST DURING STORMS, (2) HEAT BALANCE OF SNOW IN OPENINGS AND FOREST STANDS.

Investigator: David H. Miller, U.S. Forest Service, Pacific Southwest Forest and Range Expt. Sta., P. O. Box 245, Berkeley 1, Calif.

Scope: Micrometeorological factors operating in presence of forest (forest stands of differing density and forest openings of differing size and shape) that affect deposition of snow and the supply of heat (especially shortwave and longwave radiation) to the snow in spring.

Reports: No reports published as yet. (Field observations of the micrometeorological elements are just beginning.) As a result of an extensive literature survey on the influences of forest on snow accumulation, it was possible to re-analyze and make comparative studies of considerable published data. This critique on the interception of falling snow is now in review.

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## II - PUBLICATIONS CONTAINING ABSTRACTS OF PAPERS ON SNOW

Meteorological and Geostrophysical Abstracts. Published monthly. American Meteorological Society, 45 Beacon St., Boston 8, Mass. Vol. 12 (1961) \$60.00. Members' Price, \$15.00.

Vol. 7, Nos. 7 and 8, 1956 include special section on snow meteorology.

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Bibliography on Snow, Ice and Permafrost with Abstracts. Published semi-annually. U. S. Army Cold Regions Research and Engineering Laboratory, Corps of Engineers, Hanover, N. H.

Each volume is an accumulation of the abstracts published weekly on standard catalog cards. The Cumulative Index or a complete set of the cards arranged under the subject headings in the Index is particularly useful.

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Selected Bibliography of Hydrology to the end of 1958, Canada. Single volume. Supplements may be published in future. National Research Council, Assoc. Comm. on Geodesy and Geophysics, Subcommittee on Hydrology, and Dept. of Northern Affairs and Nat. Resources, Water Resources Branch, Ottawa, Canada, 1959.

Abstracts are given for a few of the papers.

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Bibliographie Hydrologique, Suisse. Annually or every few years (e.g. Annuaire 10-14, 1948-1952). Commission d'Hydrologie de la Société Helvétique des Sciences Naturelles, Comm. Helvétique des Glaciers (Soc. Hel. des Sciences Naturelles), Comm. Fédérale pour l'Etude des Neiges et des Avalanches.

This and the preceding bibliographies are examples of a series of national bibliographies of hydrology established by the International Assoc. of Scientific Hydrology.

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Arctic Bibliography. Published annually. U. S. Dept. of Defence, Washington. Prepared by the Arctic Institute of North America. Vol. 9 (1960) \$5.50.

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The Polar Bibliography. Vol. 2 published in March, 1957. Technical Information Division of the Library of Congress.

Abstracts of articles on equipment and techniques for cold weather, and on man in a cold environment.

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The Polar Record. Published in January, May and September. Scott Polar Research Institute, Lensfield Road, Cambridge, England. \$5.00.

Very brief abstracts, arranged by subject. Much more extensive than most journals.

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Ice. Published in January and July. British Glaciological Society, c/o Scott Polar Research Institute, Lensfield Road, Cambridge, England.

\$6.00 for membership in B.G.S.

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Quarterly Journal of the Royal Meteorological Society. Published quarterly. Royal Meteorological Society, 49 Cromwell Road, London, S.W.7. Annual subscription \$16.00.

Reviews ranging from 200 to 600 words include hydrological and geographical subjects.

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Journal of Geophysical Research. Published monthly. American Geophysical Union, 1407 Sherwood Ave., Richmond, Va. \$10.00 with membership in A.G.U. Occasionally contains abstracts of papers presented at meetings of the A.G.U.

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Technical Abstracts Bulletin. Published semi-monthly. Armed Services Technical Information Agency (ASTIA), Arlington Hall Station, Arlington 12, Va. Free to those engaged in Government contracts.

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Current Contents. Published weekly. Institute for Scientific Information, 33 South Seventeen Street, Philadelphia 3, Penna.

\$50.00/yr. to educational institutions, \$100.00 to all others. Titles only - space and physical sciences.

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Civil Engineering. Published monthly. American Society of Civil Engineers, 345 East 47th Street, New York 17, N. Y.

\$5.00/yr. Abstracts of current ASCE Proceedings included as regular feature.

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Engineering Index. Published annually (complete index, bound volume), and monthly (card service covering specific headings). Engineering Index, Inc., United Engineering Center, 345 East 47th Street, New York 17, N. Y. Cost varies for each card service covered. Check publisher.

Headings of probable interest to Eastern Snow Conference are: Foundations-Permafrost, Hydrology, Ice, Meteorology, Soils-Frozen, Snow, Snow Surveys, and Snowslides.

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